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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/749,926	12/29/2000	Kazuhiro Takahashi	35.G2735	6871

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EXAMINER

NGUYEN, HUNG

ART UNIT	PAPER NUMBER
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2851

DATE MAILED: 03/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/749,926

Applicant(s)

TAKAHASHI ET AL.

Examiner

Henry Hung V Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 December 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 4 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claims 4 and 10, it is not clearly understood how the processing system can determine “the change in transmittance based on the detected result of the first photodetector the information regarding *transmisstance of the original*” as claimed. The first photosensor (12) is for monitoring light projected to the wafer (W). The first photosensor (12) can not detect information regarding the transmissions of the original” as claimed. Please explain.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

As best the claimed subject matters are understood (see rejection under 35 U.S.C. 112, second paragraph, *supra*). Claims are anticipated by references.

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4. Claims 1-5, 7-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi et al (U.S.Pat. 5,892,573).

With respect to claims 1, 8 and 12, Takahashi et al (fig.1) discloses an exposure apparatus and method comprising all basic features of the instant claims such as: a light source (1) comprises a pulse light; an illumination optical system (2, 3, 20-21, 5-8) for illuminating a predetermined pattern formed on reticle (R); a projection optical system (10) for projecting the pattern formed on the reticle onto a substrate (W); a first photodetector (12) disposed in a portion for receiving light from an optical path between the light source and a portion where the reticle is positioned for monitoring an emission light amount from the light source and light processing systems (102-103) for processing the detected signal from the first light quantity detector (12) and correcting the coefficient/output energy (see col.5, lines 65-67 and col.6, lines 1-5; col.7, lines 1-4).

With regard to claims 2-5, 7, 9-11 and 13, Takahashi et al further teaches the processing system further performs sensitivity correction of the first photo detector relative to an illuminance on a plane corresponding to a surface of the substrate in accordance with the estimated change of transmissance (see col.6, lines 20-34); a reticle stage (9) for holding and driving the reticle in a direction perpendicular with the optical axis of the illumination optical system ; a second photo detector (13) having a light receiving surface placed at the height of the substrate for detecting the exposure light passing thru a light transmittance portion the reticle stage; an ND filter (20) and a masking plate (6) and the processing system determines the changes in the transmissance of the illuminating system and the projection optical system.

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5. Claims 1-2, 4-5, 7-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Nishi (U.S.Pat. 5,861,944).

With respect to claims 1-2, 4-5, 7-13, Nishi (fig. 1) discloses an exposure apparatus/method comprising all of the limitations of the instant claims including: a light source (1), an illumination system for irradiation a reticle (R) having a pattern formed thereon; a ND filter (34); a first photosensor (11) for detecting an emission light amount from the light source; a second photosensor (58) placed on the same plane of the substrate (61) for detecting the exposure amount passing thru the reticle stage; an exposure amount control system (38) and main control system (41) for calculating the transmission change of the optical element based on the detected signals from the photosensors and correcting the coefficients of the light source based on the calculated transmission change.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al (U.S.Pat. 5,892,573).

With regard to claim 6, Takahashi et al (fig. 1) discloses a projection exposure apparatus/method comprising substantially all of the limitations of instant invention as discussed above. Takahashi et al does not expressly disclose the processing system that determines the

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change in transmissance of the illumination optical system and the projection optical system based on "information regarding output energy per pulse, an oscillation frequency and oscillation duty of the pulsed laser and voltage applied to the pulsed laser, a transmittance of the ND filter and the reticle, and the illumination extent formed by the masking plate". However, Takahashi noted "the masking blade 6 is moved to effect light blocking in an appropriate range" (see col.6, lines 60-61); "Optimum transmissivity of the ND filter 20 can be calculated by the light quantity calculating means 102" (see col.7, lines 40-42); the output voltage applied to the pulsed laser as well as the pulse emission frequency of the light source is set by control system 103 (see col.6, lines 65-67 and col.8, lines 20-26). In view of such teachings, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Takahashi et al to obtain the invention as specified in claim 6. It would have been obvious to a skilled artisan to estimate the changes in the transmissance of the illumination optical system and the projection lens in accordance with those well known parameters so that the proper exposure amount can be accurately calculated and thus improving the quality of the images to be printed.

8. Claims 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (U.S.Pat. 5,861,944) in view of Takahashi et al (U.S.Pat. 5,892,573).

With regard to claim 3, Nishi discloses substantially all of the limitations of the instant claim including a second photodetector (58) disposed near wafer. Nishi lacks to disclose the second photodetector "detects the exposure light passing through a light transmitting portion of the reticle stage placed at a position different from that of a portion where the pattern is positioned". Takahashi et al (fig.3) teaches "a second photodetector that detects the exposure

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light passing through a light transmitting portion (14) of the reticle stage placed at a position different from that of a portion where the pattern is positioned”.

As to claim 6, Nishi does not expressly disclose the processing system that determines the change in transmissance of the illumination optical system and the projection optical system based on “information regarding output energy per pulse, an oscillation frequency and oscillation duty of the pulsed laser and voltage applied to the pulsed laser, a transmittance of the ND filter and the reticle, and the illumination extent formed by the masking plate”. Takahashi et al teaches “ the masking blade 6 is moved to effect light blocking in an appropriate range” (see col.6, lines 60-61); “Optimum transmissivity of the ND filter 20 can be calculated by the light quantity calculating means 102” (see col.7, lines 40-42); the output voltage applied to the pulsed laser as well as the pulse emission frequency of the light source is set by control system 103 (see col.6, lines 65-67 and col.8, lines 20-26). In view of such teachings, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of Nishi and Takahashi et al to obtain the invention as specified in claims 3 and 6 so that the intensity of the illumination can be accurately measured whereby the exposure amount for exposing the wafer can be provided with a highest degree of precision.

Prior Art Made of Record

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


Tsuji (U.S.Pat. 6,211,947), Nishi (U.S.Pat. 6,115,107) and Kurosawa et al (U.S.Pat. 6,204,911) discloses an exposure apparatus and method for controlling the exposure amount.

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10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Henry Hung V Nguyen whose telephone number is 703-305-6462. The examiner can normally be reached on Monday-Friday (First Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russ Adams can be reached on 703-308-2847.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4900.


Henry Hung V Nguyen
Examiner
Art Unit 2851

hvn
February 26, 2002